US006130883A

United States Patent [19]

Spear et al.

[11] Patent Number: 6,130,883

[45] Date of Patent: Oct. 10, 2000

[54] METHOD AND APPARATUS FOR VOICE PACKET COMMUNICATIONS

[75] Inventors: **Stephen Spear**, Skokie; **Sanjay Gupta**, Chicago, both of Ill.

[73] Assignee: **Motorola, Inc.**, Schaumburg, Ill.

[21] Appl. No.: **09/124,946**

[22] Filed: **Jul. 30, 1998**

[51] **Int. Cl.**[7] **G01R 31/08**

[52] **U.S. Cl.** **370/328**; 370/466; 455/517

[58] **Field of Search** 370/328, 335, 370/349, 338, 352, 356, 342, 379, 401, 465, 466, 467; 455/49.1, 54.1, 509, 507, 517; 340/825.03

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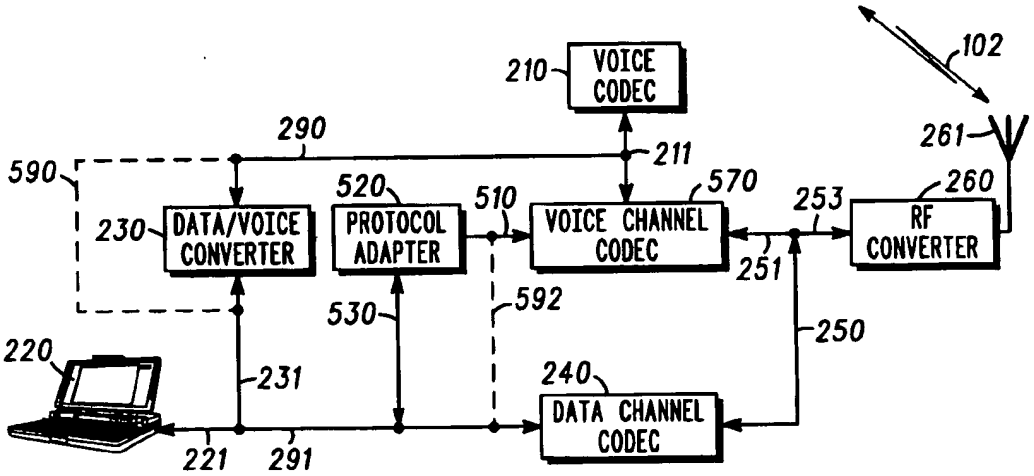
Primary Examiner—Alpus H. Hsu
Assistant Examiner—Duc Ho
Attorney, Agent, or Firm—Kenneth A. Haas

[57] **ABSTRACT**

A wireless communication system (**100**) provides an over the air efficient communication of packet voice information between a mobile station (MS) (**101**) and a host (**112**) connected to a data packet switching network (**110**). Via a wireless link (**102**), a base station system BSS (**118**) receives voice channel coded voice information from MS **101**, after decoding in BSS (**118**), adapting a decoded voice information to a data packet switching format, and communicating the decoded voice information to host (**112**) through data network (**101**).

24 Claims, 4 Drawing Sheets



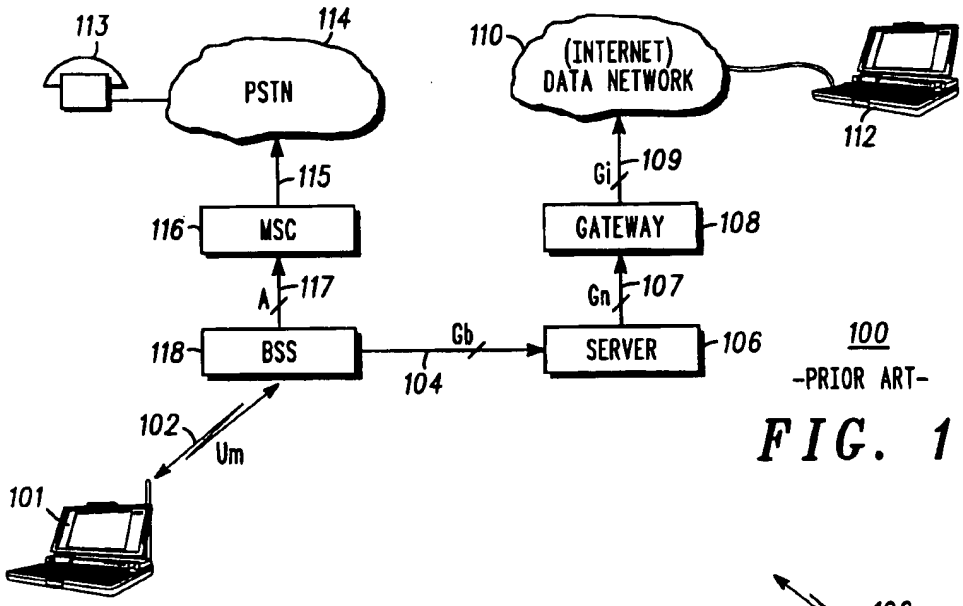


FIG. 1

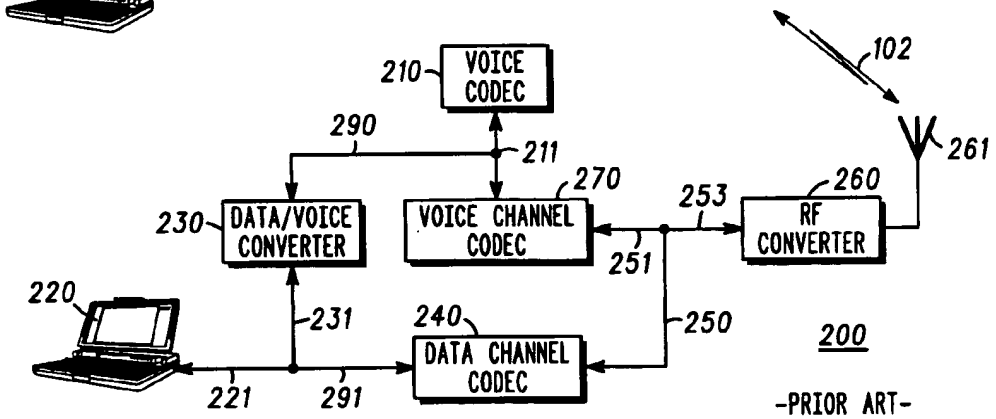


FIG. 2

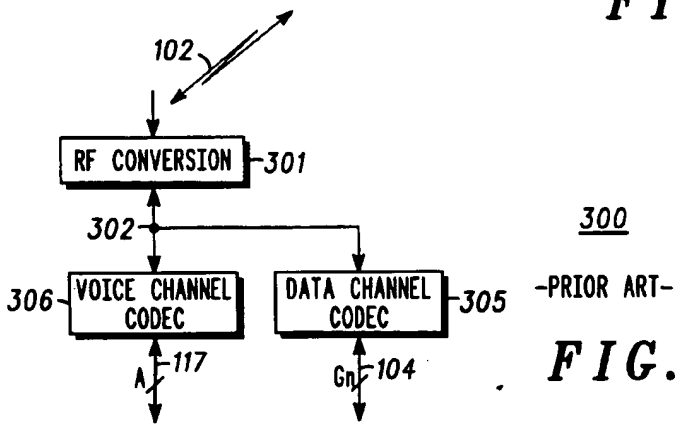


FIG. 3

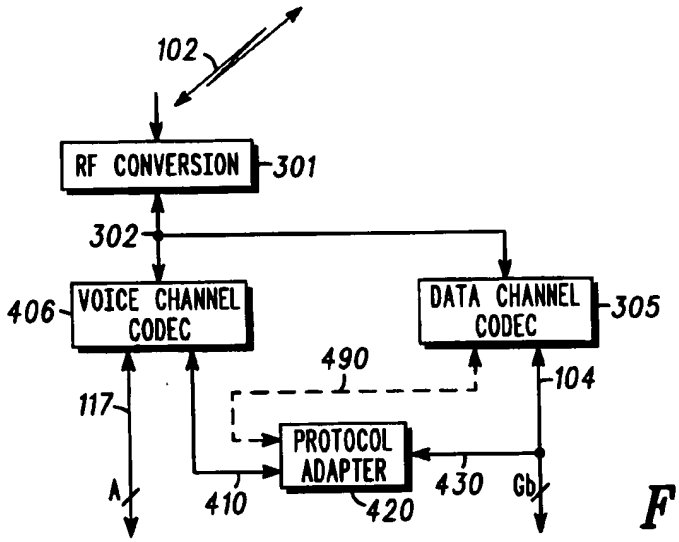

102
RF CONVERSION
301
302
406
VOICE CHANNEL CODEC
DATA CHANNEL CODEC
305
490
104
117
PROTOCOL ADAPTER
A
410
420
430
Gb
400

FIG. 4

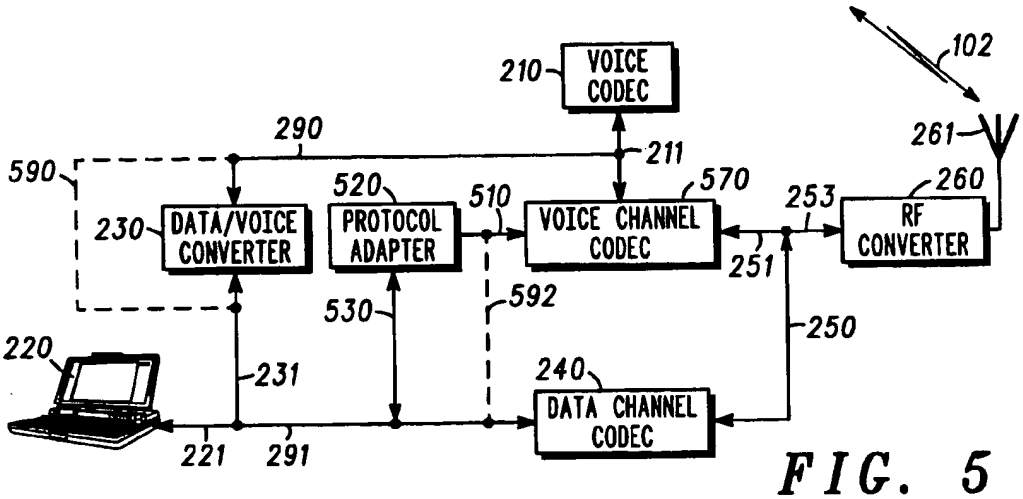

102
210
VOICE CODEC
290
211
261
590
520
510
570
253
260
230
DATA/VOICE CONVERTER
PROTOCOL ADAPTER
VOICE CHANNEL CODEC
RF CONVERTER
251
530
592
250
220
231
240
DATA CHANNEL CODEC
221
291

FIG. 5

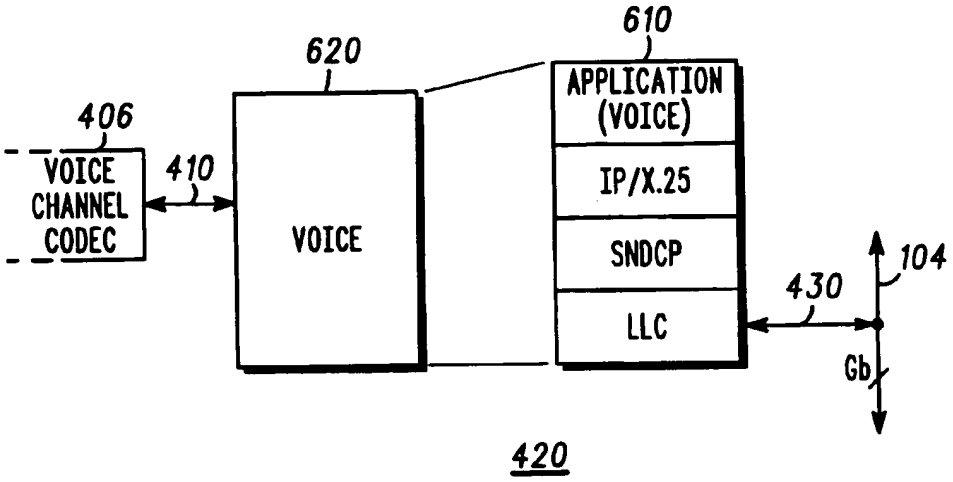

610
620
APPLICATION (VOICE)
406
VOICE CHANNEL CODEC
410
VOICE
IP/X.25
SNDCP
104
430
LLC
Gb
420

FIG. 6

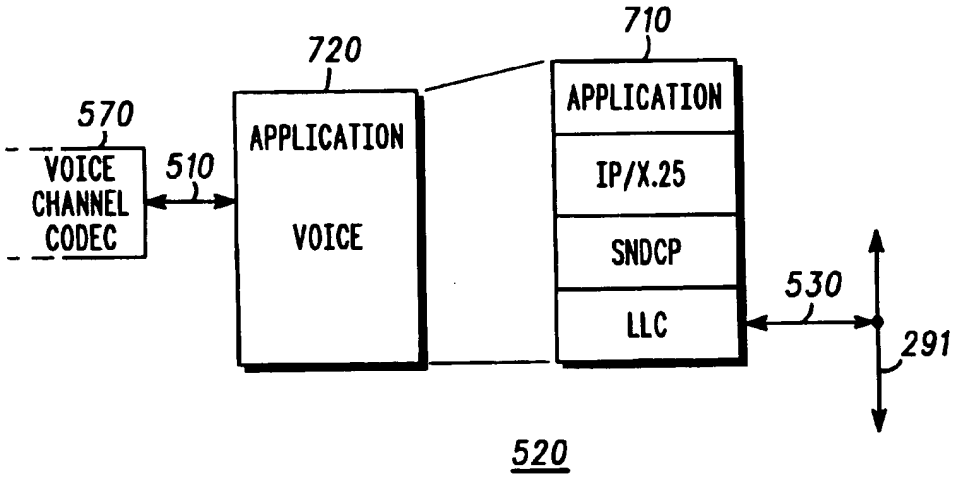

710
720
APPLICATION
570
VOICE CHANNEL CODEC
510
APPLICATION
VOICE
IP/X.25
SNDCP
530
LLC
291
520

FIG. 7

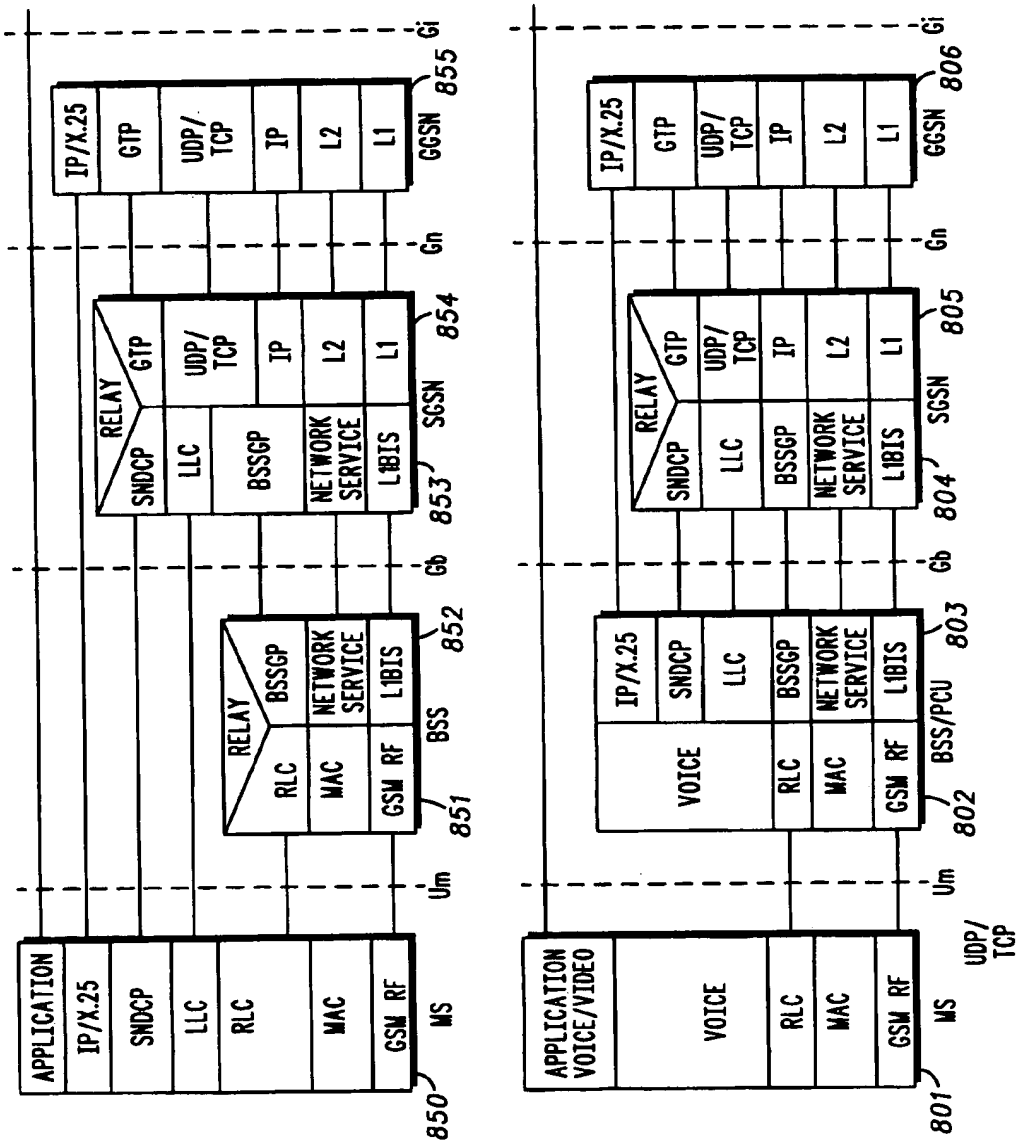

APPLICATION
IP/X.25
SNDCP
LLC
RLC
MAC
GSM RF
MS
850
Um
RELAY
BSSGP
NETWORK SERVICE
L1BIS
RLC
MAC
GSM RF
BSS
851
852
Gb
RELAY
GTP
UDP/TCP
IP
L2
L1
SNDCP
LLC
BSSGP
NETWORK SERVICE
L1BIS
SGSN
853
854
Gn
IP/X.25
GTP
UDP/TCP
IP
L2
L1
GGSN
855
Gi
APPLICATION VOICE/VIDEO
VOICE
RLC
MAC
GSM RF
MS
801
UDP/TCP
Um
VOICE
IP/X.25
SNDCP
LLC
RLC
BSSGP
NETWORK SERVICE
MAC
GSM RF
L1BIS
BSS/PCU
802
803
Gb
RELAY
GTP
UDP/TCP
IP
L2
L1
SNDCP
LLC
BSSGP
NETWORK SERVICE
L1BIS
SGSN
804
805
Gn
IP/X.25
GTP
UDP/TCP
IP
L2
L1
GGSN
806
Gi

FIG. 8

METHOD AND APPARATUS FOR VOICE PACKET COMMUNICATIONS

FIELD OF THE INVENTION

The present invention generally relates to communication systems, and more particularly to voice packet communication in the communication systems.

BACKGROUND OF THE INVENTION

Normally, a land-based data communication network transports information by using data packet switching. A wireless communication system, such as Global System for Mobile Communications (GSM), however, transports information in predefined or selected time slots over its wireless communication links. A GSM network transports data information by using circuit switching network. As a result, voice information is typically transferred in a circuit switched manner. A copy of GSM system specification and standards may be obtained by contacting European Telecommunications Standards Institute, 650 Rt. des Lucioles—Sophia Antipolis, Valbonne—FRANCE. A GSM communication system may provide general packet radio service (GPRS) along with traditional PSTN services according to the GSM standards. General packet radio services are provided via a data network operating based on data packet switching.

When voice information is transmitted in a wireless communication system, and the voice information is intended to be routed by data packet switching to reach a destination host, the voice information in the transmitter is treated like data packet information. As a result, a substantial number of overhead data bits are added to the voice information before its transmission. The amount of overhead data bits often times occupy most of the wireless communication bandwidth. Since the time slots of the wireless link have predefined and fixed duration and bandwidth, communication of voice information when treated like data information in the wireless communication system would occupy a larger bandwidth of the system capacity and a larger number of time slots than communication of the same amount of voice information when treated like voice information. Such a use of available system bandwidth is inefficient.

Therefore, there is a need for a method and apparatus for efficiently communicating voice information in a wireless communication system when the voice information is routed through a data network operating based on data packet switching.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** depicts a general block diagram of a communication system according to prior art.

FIG. **2** depicts a general block diagram of a mobile station according to prior art.

FIG. **3** depicts a general block diagram of a base station system according to prior art.

FIG. **4** depicts a block diagram of a base station system according to various embodiments of the invention.

FIG. **5** depicts a block diagram of a mobile station according to various embodiments of the invention.

FIG. **6** depicts a functional description of a protocol adapter used in a base station system according to various aspects of the invention.

FIG. **7** depicts a functional description of a protocol adapter used in a mobile station according to various aspects of the invention.

FIG. **8** depicts a functional description of protocol stacking at various connections in a communication system according to various aspects of the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

According to various embodiments of the invention, in a wireless communication system providing communication of voice information between a mobile station (MS) and a host through a base station system (BSS), a method includes establishing a wireless link between the MS and BSS, channel coding the voice information in the MS according to a channel coding scheme to produce channel coded voice information, transmitting the channel coded voice information from the MS over the wireless link to be received by the BSS, channel decoding the channel coded voice information based on the channel coding scheme to produce decoded voice information in the BSS, adapting the decoded voice information to a packet voice information, and communicating the packet voice information to the host through a data network that operates based on data packet switching. Since the voice information is not appended with overhead data bits and is not treated like data information at the MS, the voice information does not carry the additional overhead data bits when transmitted over the wireless link. As a result, the bandwidth of the wireless link is used efficiently for communication of voice information. Moreover, fewer time slots in the wireless link are selected to communicate the voice information while the voice information reaches its destination host through a data network operating based on data packet switching.

Similarly, if communication of the voice information is generated from the host connected to the data network, the BSS channel codes the voice information according to a voice channel coding scheme, rather than using a data channel codec. The voice information format is adapted from a data packet switching format to a format suitable for coding in the channel codec. The channel coded voice information is transmitted to the MS via a wireless link. As such, the MS receives the voice information by decoding the voice information according to the coding scheme. IF the voice information is intended to be received by a data generating device, the decoded voice information may need to be adapted to a data packet switching format.

Although, through out this application, one or more communication paths have been described, there are other communication paths that the invention is similarly applicable. The examples and other descriptions in the disclosure do not limit the scope and applicability of the invention. The description provided in the application allows for one reasonably skilled in the art to understand and find other communication paths that may exist. The following describes in detail the communication path from the MS to a telephone subscriber or a host. The communication path from the telephone subscriber or the host to the MS is easily understandable by one reasonably skilled in the art.

Referring to FIG. **1**, a general block diagram of a communication system **100** is shown according to prior art. Communication system **100** provides general packet radio services (GPRS) along with the traditional PSTN services. Communication system **100** provides applications of communicating voice information to a host **112** and a subscriber **113**. Host **112** is connected to a data packet switching network **110**, and subscriber **113** connected to a public switching telephone network (PSTN) **114** operating based on circuit switching. The applications include communication of voice information over Internet Protocol (IP) via network **110**.

A MS **101** and BSS **118** have a wireless communication link **102** to communicate voice information, among other types of information. To provide general packet radio service (GPRS) along with the traditional PSTN services according to GSM standards, BSS **118** has connections to PSTN **114** and data packet switching network **110**. More information about GPRS is available by referring to GSM standards. BSS **118** communicates at a connection **104** to data packet switching network **110**, and at connection **117** to PSTN **114** which is operating based on circuit switching. The voice information may be routed through PSTN **114** or data network **110**. Data packet switching network **110** may be an internet which is a collection of ports connected through a web of network connections.

If the voice information is intended for host **112**, according to prior art, the voice information is converted to data type information in MS **101** before its transmission from MS **101** via wireless communication link **102**. The data conversion includes appending protocols data bits. The appended data bits facilitate transportation and identify the routing of the voice information in data packet switching network **110**. Host **112** may be connected to data network **110** at any of its ports. For example, for application of transporting voice information over Internet Protocol (IP), the appended data bits to the voice information are according to IP. The voice information with its appended data bits according to IP is routed through data network **110** to reach its destination at host **112**. If the voice information is intended for telephone subscriber **113** connected to PSTN **114**, the voice information normally is transmitted from MS **101** without the additional overhead data bits.

MS **101** communicates the voice information to BSS **118** over wireless link **102** according to "Um" interface as defined in the GSM standards. BSS **118**, then, communicates the voice information to a server **106** via connection **104** according to a "Gb" interface as defined by GSM standard. The communication via connection **104** is preferably in a data packet switching format. Server **106** and a gateway **108** and their interconnection **107** at "Gn" interface as defined by GSM specification facilitate the data packet switching communication between BSS **118** and data network **110**. Gateway **108** communicates to network **110** via a connection **109** according to "Gi" interface as defined by GSM specification. Data network **110** transports the voice information to host **112**.

If the voice information transmitted from MS **101** via link **102** is intended to be routed through PSTN **114** to reach a subscriber **113**, BSS **118** through a connection **117** communicates the voice information to a mobile station controller (MSC) **116**. Connection **117** is according to an "A" interface as defined in the GSM standards. MSC **116** transports the voice information over a circuit switched connection at connection **115** to PSTN **114**. PSTN **114** is normally connected to telephone subscribers, such as subscriber **113**. PSTN **114** operates based on circuit switching. The voice information accordingly is routed in PSTN **114** to reach subscriber **113**.

Referring to FIG. **2**, a general block diagram **200** of MS **101** according to prior art is shown. Voice codec **210** codes voice information that may be generated by a person's voice or artificially created to produce voice information **211**. The voice coding in voice codec **210** is according to a voice coding scheme that is defined by the GSM standard. If voice information **211** is intended to be received by host **112**, voice information **211** is routed via a connection **290** to a data and voice converter **230** for conversion of voice information **211** to data packets that are suitable for transmission to host **112** via data packet switching network **110**. As a result, data and voice converter **230** appends voice information **211** with overhead data bits. Data and voice converter **230** produces data packets **231**.

The voice information may also be generated by a data information generator **220**, however, such voice information is already converted to a format suitable for transportation via data packet switching network **110**. Data information generator **220**, such as a computer, produces the information in data packet **221**. Data packets **231** and **221** are routed to data channel codec **240** via connection **291**. Data channel codec **240** channel codes data packets **231** or **221** to produces a channel coded information **250**. Channel coded information **250** passes to a radio frequency (RF) converter **260** via a connection **253**. RF converter **260** converts channel coded information **250** to a suitable format for a radio frequency transmission from an antenna **261** via wireless link **102**. Wireless link **102** is according to "Um" interface.

Similarly, if voice information **211** is intended to be received by subscriber **113**, voice channel codec **270** channel codes voice information **211** to produce a voice channel coded information **251**. Voice channel coded information **251** passes to RF converter **260** via connection **253**. RF converter **260** converts voice channel coded information **251** to a suitable format for radio frequency transmission from antenna **261** via wireless link **102**. Wireless link **102** is according to "Um" interface.

Referring to FIG. **3**, a general block diagram **300** of BSS **118** is shown according to prior art. An RF converter **301** converts the RF signal received via wireless link **102** to a signal **302** in a suitable format for reception by a voice channel codec **306** or a data channel codec **305**. Signal **302** may be in digital or analog based band format. If the information, including voice information, carried by wireless link **102** is coded in data channel codec **240**, signal **302** is routed to a data channel codec **305**. Data channel codec **305** after decoding signal **302** produces the decoded information at connection **104** according to "Gb" interface. Data channel codec **305** produces, preferably, the decoded information in voice data packets at connection **104** if the transmitted information is voice information.

If the voice information carried by wireless link **102** is coded in voice channel codec **270**, signal **302** is routed to voice channel codec **306**. Voice channel codec **306** decodes the voice information, and outputs the decoded voice information at connection **117** according to "A" interface.

Referring to FIG. **4**, a block diagram **400** of a BSS according to various embodiments of the invention is shown. If the information carried by wireless link **102** is coded by a data channel codec, such as data channel codec **240**, the signal **302** is routed to data channel codec **305**. Data channel codec **305** produces decoded data information at connection **104** according to "Gb" interface. Communication via connection **104** preferably is based on data packet switching. If the information carried by wireless link **102** is coded by a voice channel codec, such as voice channel codec **270**, signal **302** is routed to a voice channel codec **406**. Voice Channel codec **406** outputs the decoded voice information at connection **117** according to "A" interface. If the voice information is to be routed through data packet switching network **110**, voice channel codec **406** decodes signal **302** and outputs a signal **410**. Signal **410** carries the decoded voice information to a protocol adapter **420**. Protocol adapter **420** adapts the decoded voice information received by signal **410** to a data packet switching format and accordingly outputs a signal **430**. Signal **430** carries the voice

information in a suitable data packet switching format for transportation over data network **110** at connection **104** according to "Gb" interface. Since the protocol adapter **420** adapts the voice information to a format suitable for data packet switching, MS **101**, therefore, is not required to code the voice information by a data channel codec. The voice information is transmitted from MS **101** and routed through a data packet switching network **110** without occupying a substantial portion of the communication bandwidth of wireless link **102**.

Protocol adapter **420** may also be used to exchange voice information with data channel codec **305**. In such a case, a connection **490** facilitates adapting voice information received or transmitted from data channel codec **305**. The adapted voice information is channel coded or decoded by data channel codec **305**. The adapted voice information does not have the usual over head data bits even though the voice information is being coded by data channel codec **305**. As a result, the over the air communication bandwidth is preserved for communication of voice information.

As a result, a GSM system that is providing general packet radio services (GPRS) along with traditional PSTN services does not require its mobile stations to transmit data channel coded voice information when the voice information is intended for a host connected to a data packet switching network. The voice information is routed through data packet switching network **110** without appending the voice information with overhead data bits before being transmitted from the mobile stations. The communication bandwidth of wireless link **102**, therefore, is used efficiently.

Advantages of the invention includes the capacity of the communication system to use a predefined voice channel coding scheme that is for voice channel coding of the voice information when the voice information is intended to be routed over data packet switching network **110**. As a result, MS **101** may incorporate a voice channel codec that has a coding scheme optimized for channel coding of voice information in addition to other GSM standard voice channel codec.

Referring to FIG. **4**, if signal **302** carries voice information that is coded according to a predefined coding scheme, voice channel codec **406** decodes signal **302** according to the predefined coding scheme. A selector selects the coding scheme, and the voice channel codec **406** produces the decoded voice information according to the selected coding scheme which may be either GSM standard voice coding scheme or the predefined coding scheme. Such a selector is not shown because it may be incorporated in many different ways in block diagram **400**. However, the most suitable place for such a selector is in voice channel codec **406**. The predefined channel coding scheme is optimized for transporting voice information over data network **110**.

Referring to FIG. **5**, a block diagram **500** of MS **101** is shown according to various embodiments of the invention. Voice information **211** is routed to voice channel codec **570**. Voice channel codec **570** channel codes voice information **211** according to the GSM standard voice channel coding scheme or a predefined coding scheme that is optimized for transporting voice information **211** in a packetized format over the air interface, such as interface "Um". A selector, not shown, selects the appropriate coding scheme. The selector is not shown because it may be implemented in many different ways. Preferably, such a selector is internal to the inter-working operation of voice channel codec **570**. If voice information **211** is intended to be received by subscriber **113** connected to PSTN **114**, standard GSM voice coding is selected. If voice information **211** is intended to be received by host **112** connected to data packet switching network **110**, the predefined coding scheme is selected. The predefined channel coding scheme is optimized for efficient channel coding of packetized voice information for over the air interface communication. As a result, the bandwidth of wireless link **102** is preserved for communication of voice information.

The coding scheme in voice codec **210** is paired with the predefined channel coding scheme to provide the most efficient method of communicating the packetized voice information over the air interface. In a case where the predefined coding scheme is not paired with the voice coding scheme in voice codec **210**, voice information **211** may be routed directly to data channel codec **240** while bypassing data and voice converter **230** via connection **590**. Although data channel coding voice information **211** without performing the data and voice conversion in data and voice converter **230** may produce slightly less than desirable voice quality, such a method is efficient for communicating the packetized voice information over the air interface. The degradation in voice quality in such a case may be acceptable in certain circumstances.

In case data information generator **220** is producing data packet **221** that includes voice information, such as computer generated voice information, data packet **221** may be routed to a protocol adapter **520** for adapting data packet **221** to a format suitable for voice channel coding by voice channel coder **570**. Connections **530** and **510** facilitate such routing. A selector, not shown, selects whether data packets **221** received at connection **291** is to be coded by data channel codec **240** or **570**. If data packets **221** are carrying voice type information, voice channel codec **570** preferably codes data packets **221**. Moreover, when data packets **221** are carrying voice information and such voice information is intended to be routed through data packet switching network **110**, voice channel codec **570** preferably codes data packets **221**. Data packets **221** are adapted by protocol adapter **520** to a suitable format for voice coding in voice channel codec **570**.

In case the converted data packets **211** at connection **510** do not have a channel coding scheme that is paired with the voice coding scheme used in data information generator **220**, the converted data packets **211** at connection **510** are routed via a connection **592** to data channel codec **240** for channel coding. Although data channel coding the converted data packets **211** at connection **510** may produce slightly less than desirable voice quality, such a method is efficient for communicating the packetized voice information over the air interface. The degradation in voice quality in such a case may be acceptable in certain circumstances.

If the voice information in data packet **221** is intended to be received by subscriber **113** connected to PSTN **114**, standard GSM voice coding is selected in voice channel codec **570**. If voice information in data packet **221** is intended to be received by host **112** connected to data packets switching network **110**, the predefined coding scheme is selected. The predefined coding scheme provides better voice quality than the data channel coding scheme for the same amount of overhead data bits. The amount of overhead data bits in the predefined coding scheme may be substantially less than the amount of overhead data bits in the data channel coding scheme while maintaining the same voice quality. As a result, the bandwidth of wireless link **102** is preserved for communication of voice information.

Referring to FIG. **6**, a functional description of protocol adapter **420** is shown. By signal **430**, at connection **104**, the

data packets are received and transmitted according to protocol stacking **610**. Such protocol stacking includes internet protocol (IP). A protocol stacking **620** also is observed by signal **410** that is received or transmitted from voice channel codec **406**. For more information regarding the protocol stacking refer to GSM standard. Protocol stacking **620** is suitable for communication of voice information with codec **406**, and protocol stacking **610** is suitable for data packet switching network **110**. Protocol adapter **420** adapts the protocol carried by signal **430** to signal **410**, and adapts the protocol carried by signal **410** to signal **430**.

Referring to FIG. **7**, a functional description of protocol adapter **520** is shown. The data packets received or transmitted by signal **530** are adapted to protocol stacking **710**. Such protocol stacking includes internet protocol (IP). A protocol stacking **720** is accordingly observed for communication of voice information by signal **510**. For more information regarding the protocol stacking refer to GSM standard. Protocol stacking **720** is suitable for communication of voice information to voice channel codec **570**, and protocol stacking **710** is suitable for data packet communication at connection **291** with data information generator **220**. Protocol adapter **520** adapts the protocol of signal **530** to signal **510**, and adapts the protocol of signal **530** to signal **510**.

Referring to FIG. **8**, a functional description of protocol stacking at various connections in communication system **100** according to various aspects of the invention is shown. The communication protocol stackings **850–855** at various interfaces in communication system **100** are shown for a case when the information communicated between the network and the mobile station is coded according to a data channel coding scheme. The over the air interface at the interface "Um" includes many data bits associated with the protocol stackings at **850** and **851**. According to an aspect of the invention, the protocol stackings at various interfaces in the communication system **100** is according to a protocol stackings **801–806**. A substantial number of overhead data bits associated with the protocol stacking has been eliminated.

According to an aspect of the invention, the channel coded voice information is transmitted from MS **101** with protocol stacking **801** according to "Um" interface standard. After radio frequency conversion at RF converter **301**, and decoding at voice channel codec **406**, signal **410** has a protocol stacking according to protocol stacking **802**. Protocol adapter **420** adapts the protocol stacking **802** to a protocol stacking **803** according to "Gb" interface. Protocol stockings **804**, **805**, and **806** facilitate transportation of the voice information through network **110** to host **112**. According to the invention, since the communication at "Um" interface is accomplished without transmission of excess protocol overhead data bits, the communication bandwidth is used efficiently while transporting voice information over a data packet switching network **110**, like voice over IP.

For communication of voice information generated from host **112**, the voice information in data packet switching format at connection **104** is adapted by protocol adapter **420** to a format suitable for voice channel coding in voice channel codec **406**. Voice channel codec **406** codes the received voice information according to a selected voice channel coding scheme. The selected coding scheme may be a predefined coding scheme optimized for communication of voice information over a data packet switching network, or a standard GSM voice channel coding scheme. The coded voice information is up-converted to a suitable radio frequency at RF conversion **301** and transmitted via wireless link **102**. The voice information accordingly is without any appended protocol bits when transmitted via wireless link **102**. As such, the communication bandwidth of wireless link **102** is preserved.

The RF signal carried via wireless link **102** is down-converted in RF converter **260**. The down converted signal is routed either to voice channel codec **570** or data channel codec **240** depending on the selected channel coding at the transmitting source. If the voice information is voice channel coded in the transmitting source and is intended to be routed to data information generator **220**, after the decoding operation, protocol adapter **520** adapts the decoded voice information at connection **510** to a suitable format at connection **530** for reception by data information generator **220**. Otherwise, the voice information is decoded in voice channel codec **570** and routed to voice codec **210**.

According to an aspect of the invention, the invention includes an step of enabling protocol adapter **420** to perform its adapting format of the decoded voice information. Such enabling is directed by BSS **118**. Once protocol adapter **420** is enabled, MS **101** does need to use data channel codec **240** for communication of voice information. BSS **118** transmits a message to MS **101** via wireless link **102** directing MS **101** to switch from data channel codec **240** to voice channel codec **570**. MS **101**, subsequently, switches the channel coding of the voice information to voice channel codec **570**.

In alternative, the enabling of protocol adapter **420** may be directed by MS **101** via wireless link **102**. The MS **101** transmits a message to BSS **118** directing BSS **118** to enable protocol adapter **420**. Once protocol adapter **420** is enabled and is ready to begin the adapting format of decoded voice information **410**, MS **101** no longer need to use the data channel codec **240** for communication of voice information. MS **101** subsequently switches from data channel codec **240** to voice channel codec **570**.

Similarly, protocol adapter **520** may be enabled such that voice channel codec **570** is used for coding voice information sourced at data generating device **220**. The enabling may be directed by BSS **118** via wireless link **102**. BSS **118** transmits a message to MS **101** directing MS **101** to switch from data channel codec **240** to the voice channel codec **570**. Alternatively, the enabling may be directed by MS **101** without any apparent change in BSS **118**. The BSS **118** receives the voice information as if it was generated from voice codec **210**.

While the invention has been particularly shown and described with reference to a particular embodiment, it will be understood by those skilled in the art that various changes in form and details may be made therein without departing from the spirit and scope of the invention. The corresponding structures, materials, acts and equivalents of all means or step plus function elements in the claims below are intended to include any structure, material, or acts for performing the functions in combination with other claimed elements as specifically claimed.

What is claimed is:

1. In a communication system providing communication of voice information between a mobile station (MS) and a host through a base station system (BSS) and a data packet switching network, a method comprising the steps of:

establishing a wireless link between said MS and BSS;

channel coding said voice information according to a channel coding scheme to produce channel coded voice information;

transmitting said channel coded voice information over said wireless link;

receiving said channel coded voice information over said wireless link;

channel decoding said channel coded voice information based on said channel coding scheme to produce decoded voice information; and

adapting format of said decoded voice information to a data packet switching format suitable for transportation of said decoded voice information over said data packet switching network or format of said decoded voice information from data packet switching format to a format suitable for said channel coding, wherein said adapting format of said decoded voice information step includes adding protocol data bits to said decoded voice information.

2. The method as recited in claim **1** further comprising the step of selecting said coding scheme from a plurality of coding schemes.

3. The method as recited in claim **2** wherein said plurality of coding schemes includes a predefined voice channel coding scheme paired with said voice information.

4. The method as recited in claim **2** wherein said plurality of coding schemes includes a data channel coding scheme.

5. The method as recited in claim **1** further comprising the steps of:

exchanging data information from a data information generator device; and

adapting format of said data information according to a voice information format to produce said voice information.

6. The method as recited in claim **5** wherein said adapting format of said data information step includes one of removing and adding protocol stacking.

7. The method as recited in claim **5** wherein said voice information format is suitable for channel coding said voice information according to said channel coding scheme.

8. The method as recited in claim **5** wherein said adapting format of said data information step includes removing protocol data bits from said data information to produce said voice information.

9. The method as recited in claim **5** wherein said adapting format of said data information step includes adding protocol data bits from said data information to produce said voice information.

10. The method as recited in claim **1** wherein said adapting format of said decoded voice information step includes adding protocol data bits to said decoded voice information.

11. The method as recited in claim **1** wherein said adapting format of said decoded voice information step includes one of removing and adding protocol stacking.

12. The method as recited in claim **11** wherein said protocol stacking is according to an internet protocol stacking.

13. The method as recited in claim **1** further comprising the step of enabling said adapting format of said decoded voice information step.

14. The method as recited in claim **13** wherein said enabling is directed by said BSS.

15. The method as recited in claim **14** further comprising the step of transmitting a message from said BSS to said MS via said wireless link directing said MS to switch from exchanging voice information in data mode to a voice mode.

16. The method as recited in claim **15** further comprising the step of switching said data channel coding of said voice information in said MS to said voice channel coding of said voice information according to said channel coding scheme.

17. The method as recited in claim **15** further comprising the step of directing said MS to switch from exchanging data information in voice mode to a data mode.

18. The method as recited in claim **13** wherein said enabling is directed by said MS via said wireless link.

19. The method as recited in claim **18** further comprising the step of transmitting a message from said MS to said BSS via said wireless link directing said BSS to enable said adapting format of said decoded voice information step.

20. The method as recited in claim **5** further comprising the step of enabling said adapting format of said data information step.

21. The method as recited in claim **20** wherein said enabling is directed by said BSS via said wireless link.

22. The method as recited in claim **20** wherein said enabling is directed by said MS.

23. In a communication system providing communication of voice information between a mobile station (MS) and a host through a base station system (BSS) and a data packet switching network connected to said host, an apparatus comprising:

means, in said BSS, for converting a radio frequency link signal transmitted from said MS to a channel coded information signal;

a voice channel codec means, coupled to said means for converting said radio frequency link signal, for decoding voice information of said channel coded information signal to produce a decoded voice information signal, wherein said means for voice channel coding includes means for selecting a voice channel coding scheme from a plurality of channel coding schemes;

a data channel codec means, coupled to said means for converting said radio frequency link signal, for decoding data information of said channel coded information signal to produce a decoded data information signal;

means for adapting protocol format of said decoded voice information signal according to a data packet switching format to produce a data packet switching signal carrying voice information;

means for coupling said data packet switching signal carrying voice information and decoded data information signal to said data packet switching network.

24. In a communication system providing communication of voice information between a mobile station (MS) and a host through a base station system (BSS) and a data packet switching network connected to said host, an apparatus comprising:

a voice codec means in said MS producing a voice information signal;

means for data and voice converter coupled to said voice codec means to convert said voice information signal to a first data information signal;

means for generating a second data information signal;

means for data channel coding said first and second data information signals;

means for voice channel coding said voice information signal, wherein said means for voice channel coding includes means for selecting a voice channel coding scheme from a plurality of channel coding schemes;

means for a protocol adapter coupled to said means for generating said second data information signal to adapt said second data information signal to a voice channel format suitable for voice channel coding by said means for voice channel coding;

means for radio frequency conversion of channel coded signals produced by said means for voice channel coding and means for data channel coding to produce a radio frequency link signal to be transmitted to said BSS.

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